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## **HAZING A BIRD REPELLENT SOLUTION**

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INVENTOR  
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### **PRIORITY CLAIM**

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This application claims priority to provisional application serial number 60/405,633 entitled Bird Repellent System filed on August 23, 2002. The provisional application is incorporated herein by this reference.

### **FIELD OF THE INVENTION**

This invention relates generally to broadcast of chemicals and, more specifically, to broadcast by aerosol means.

### **BACKGROUND OF THE INVENTION**

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United States Patent No. 5,700,474 issued on December 23, 1997 to Marvin F. Preiser and Peter F. Vogt teaches the use of liquid bird aversion solutions including solutions having methyl anthranilate. Incorporated herein by this reference, '474 teaches solutions (referred to collectively as "the solution") for spraying onto the surface of fruits, berries, and water, etc. to neutralize the natural attraction birds have for such agricultural assets. The solution is sprayed onto the assets for protection and forms a thin film. When the birds ingest the assets, the flavor is repugnant to them.




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While safe for humans, the chemistry of the solution taught in '474 breaks down to anthranilic acid, which is a corrosive chemical that causes phytotoxicity on the leaves of sprayed plants. Attempts to save the plants by encapsulating the sprayed solution in clay only delays the breakdown. The drawbacks to current bird aversion solutions include that aversion  
5 only occurs upon ingestion meanwhile, all sprayed plants suffer from phytotoxicity.

Thus, rather than wait for birds to ingest the solution, the present invention provides an airborne broadcast of the solution that repels birds without coming in direct contact with plants. A fogging machine broadcasts the solution by vaporizing its oil-based carrier with intense heat. The vapor shoots out of the exhaust tube with a noise similar to that of a lawn  
10 mower. While airborne, the droplets are inhaled by birds and cause the birds to associate the irritation and smell they detect with the place sprayed at in general and not with a specific agricultural asset, making the airborne fog an effective repellent in places such as barns, orchards and fields. Additionally, airborne fog has proven useful in hangers and on runways to protect aircraft.

Foggers produce a droplet size of solution that is approximately 30 microns in diameter on average. When foggers are used, the droplets settle out of the air too quickly and repeated foggings are necessary to achieve a prolonged effect. In addition, seeing the fog allows birds to associate the irritating quality of the fog with the presence of the fog, thus, enabling the birds to strategically avoid the fog rather than the place. Birds are also able to  
20 see the fog from afar and thus alerted, birds employ natural defenses to the fogged solution including holding their breath and deploying a mucous membrane in their eyes. Producing larger droplets proved too large for efficient repelling of birds.

Properties of the fogger also prevent entirely efficient use of the solution. The heat produced by the fogging degrades the solution. Even though some fogger settings produce at  
25 least some droplets under 10 microns, the greater portion, sometimes as much as 90%, are large droplets with their inherent shortcomings as described above.



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Thus, there currently exists an unmet need in the art for a method of dispersing bird aversion solutions without the use of degrading heat to routinely produce a droplet of less than ten microns in diameter.

#### SUMMARY OF THE INVENTION

5           The present invention provides a method and a machine for dispersing a liquid bird repellent solution. The method includes providing a liquid bird repellent solution at a first orifice. The first orifice is defined in a liquid conduit. A flow of air is released through a second orifice to an ambient atmosphere. The second orifice is defined in an air conduit. The air conduit encloses the first orifice and contains air at a pressure significantly elevated with  
10       respect to that of the ambient atmosphere. The second orifice is spaced sufficiently apart from the first orifice to allow the flow of air to form a venturi to entrain droplets of the liquid bird repellent solution into the flow of air from the first orifice.

          In accordance with further aspects of the present invention, the method disperses a haze of droplets with an average diameter of less than 20 microns.

15           In accordance with other aspects of the present invention, the machine produces a flow of air that vaporizes the droplets without the use of heat.

          In accordance with still further aspects of the present invention, the machine produces a flow of air that can be made intermittent, occurring at predetermined cycles to optimize the dispersion of solution in the ambient atmosphere.

20           In accordance with yet other aspects of the present invention, the machine coalesces droplets with diameters in excess of 20 microns, returning the droplets to a reservoir for repeated vaporization prior to releasing them to the ambient atmosphere.

          As will be readily appreciated from the foregoing summary, the present invention provides a method and a machine for the vaporization and dispersion of liquid bird repellent  
25       solutions.



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## BRIEF DESCRIPTION OF THE DRAWINGS

The preferred and alternative embodiments of the present invention are described in detail below with reference to the following drawings.

FIGURE 1 is a cross-section view of the machine's hazing head; and

5      FIGURE 2 is a flow chart of a method for dispersing a liquid bird repellent solution.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

By way of overview, the present invention provides a method and a machine for dispersing a liquid bird repellent solution. The method includes providing a liquid bird repellent solution at a first orifice. The first orifice is defined in a liquid conduit. A flow of  
10      air is released through a second orifice to an ambient atmosphere. The second orifice is defined in an air conduit. The air conduit encloses the first orifice and contains air at a pressure significantly elevated with respect to that of the ambient atmosphere. The second orifice is spaced sufficiently apart from the first orifice to allow the flow of air to form a venturi to entrain droplets of the liquid bird repellent solution into the flow of air from the  
15      first orifice.

A repellent hazer 10 formed in accordance with one embodiment of the present invention is illustrated in FIGURE 1. The repellent hazer 10 includes a tank 15 that is formed of a material suitably selected to be nonreactive with methyl anthranilate or any oil-based solution selected as a solvent for the methyl anthranilate. The tank 15 includes a reservoir 18  
20      and a fluid take-up conduit 42. The reservoir 18 receives the methyl anthranilate solution from the tank 15. The fluid take-up conduit 42 includes a first end that is inserted into the methyl anthranilate solution.

The tank 15 receives a flow of air 21 through an air conduit 24. The flow of air 21 is generated by a pressurized air source at a first end of the air conduit 24 external to the  
25      tank 15. A second end of the air conduit 24 is received in an air chamber 27 located within the tank 15. The flow of air 21 provides pressurized air to the air chamber 27. The air chamber 27 includes a fluid chamber 30. The fluid chamber 30 includes one or more



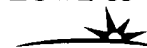
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orifices 33 located adjacent to the corresponding one or more jets 36 (collectively jet). The one or more orifices 33 and one or more jets 36 are defined at a point where the walls of the fluid chamber 30 meet the walls of the air chamber 27.

When pressurized air is received into the air chamber 27 and expelled out of the jet 36, methyl anthranilate solution is draw up in a fluid flow 39 through the fluid take-up conduit 42 into the fluid chamber 30 and expelled out of the orifice 33 in droplet form. The pressurized air creates a Bernoulli effect. The droplets expelled out of the orifice 33 are immediately vaporized by the pressurized air escaping through the jet 36. The pressurized air overcomes the surface tension blasting the droplets into a mist 45 expelled out of the jet 36.

Optionally, a fluid feed (not shown) may be advantageously employed to replenish the reservoir 18 to keep the fluid at an optimal level for hazing. One suitable system may include a needle valve and float arrangement (both not shown).

The tank 15 includes a port 54 that allows the mist 45 to escape from the tank. In one embodiment of the present invention, the port 54 is not aligned with the discharge of mist 45 from the jet 36. Large droplets in the mist 45 return to the reservoir 18 in liquid form after they strike the one or more walls of the tank 15. Air flows through the port 54 carrying smaller droplets in the mist 45 forming a useable haze external to the tank 15. Optionally, to further filter larger droplets from being dispersed with the haze, a screen 48 and/or a filter 51 may advantageously be used to cover the port 54 within the tank 15.

The screen 48 is made of nonreactive material presenting a surface onto which the droplets may coalesce. The screen 48 is canted slightly from the horizontal plane of the tank 15 in order to allow coalesced droplets to run off the screen to the tank 15 and back to the reservoir 18. Smaller droplets remain entrained in the airflow flowing through the screen 48 and out to an ambient atmosphere. Similarly, a screen of expanded open cell foam of nonreactive material suitably may serve as a filter 51 returning droplets that coalesce on the filter 51 back to the reservoir 18.



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In one embodiment, one or more fans (not shown) external to the tank 15 is employed for dispersing the mist 45 expelled from the port 54.

FIGURE 2 illustrates a method 60 for creating a bird repellent haze. At a block 63, pressurized air is delivered proximate to an orifice. At a block 66, a bird repellent solution is  
5 supplied to the orifice. The orifice is suitably sized to form droplets at the orifice. The flow of air 21 is sufficient to break the surface tension of the formed droplets to vaporize the droplets without the addition of heat. At a block 69, the air flow carries the vaporized droplets into the ambient atmosphere. This effect may be further augmented by additional streams or flows of air used to disperse the vaporized droplets throughout the ambient  
10 atmosphere.

While the preferred embodiment of the present invention has been illustrated and described, as noted above, many changes can be made without departing from the spirit and scope of the invention. Accordingly, the scope of the invention is not limited by the disclosure of the preferred embodiment. Instead, the invention should be determined entirely  
15 by reference to the claims that follow.



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